their temperature requirements, this stimulus must probably be related to tidal action or lunar cycle. However, these influences cannot be accurately defined because of the appearance of both new and full moon phases during these periods. The maximum tidal ranges during which A. scabra spawned were 6.6 feet (June to July, 1951), 7.3 feet (February, 1950), and 8.7 feet (July, 1951). As with A. digitalis, these are quite inconclusive. The sea water temperatures at which spawnings occurred vary from a near minimum for this latitude (e.g., 50.0°F. in February, 1950) to 57.5°F. during June and July, 1951. This range is appreciably more than that found for the A. digitalis population on the breakwater.

Literature Cited

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1961. A study of the reproductive cycle in California Acmaeidae (Gastropoda). Part II. Veliger 3 (4): 95 to 101, pls. 15-17.

Color Photography of Living Marine Mollusks

by

Alfred A. Blaker

Scientific Photographic Laboratory, University of California, Berkeley 4, California

FILMS

Any discussion of the color photography of scientific subjects must begin with some rather plain talk concerning the properties of the most readily available films. It should at the outset be realized that no color film made can reproduce exactly the complete range of tones of nature. The dyes which are presently available to the manufacturers are simply not that close to the theoretical needs. According to the statements of the makers, then, color films are designed to give an agreeable representation of what the eye sees. This is not to say that such films are necessarily poor in fidelity, but rather to point out that deviations from the ideal are to be expected and that they will differ from film to film. In fact, there will even be some deviations present between different batches of the same make and type of film.

My remarks on this subject will, of course, reflect my own experience to a considerable degree, but they will be supplemented to some extent both by certain statements by the manufacturers and by what I have read in the popular photographic press. Some basic knowledge of photography and its terminology will have to be assumed in order to limit the length of the discourse.

First of all, the films covered will be only the commonly available American products, because this is where my experience lies. Included will be Eastman Kodak's familiar Kodachrome and Ektachrome. Also mentioned will be Ansco's equally well known Anscochrome types. Negative materials will not be covered since the scientific uses normally require the transparency form. Only roll films are covered.

Probably the oldest and best known presently available color film is Kodachrome, which is respected everywhere for its very high resolution. In this respect it is easily the best film made. It also has the highest contrast of any color film made. Where sheer power to resolve fine detail is the main requirement, this film is the natural choice. Unfortunately, the high contrast brings difficulties in that lighting must be very soft and diffuse in order not to lose all shadow detail in a sink of blue-black nothingness. As to color fidelity, the common description of Kodachrome colors is "postcardy". That is, the colors are just too brilliant to be true. This is especially true in the blues and orange-reds. Lastly, the previously mentioned high contrast brings another trouble in that exposure latitude is thereby restricted, and small mistakes in exposure calculation show up all too readily.

But all is not lost. Eastman has just recently placed on the market the new Kodachrome II, which is said to correct many of the mentioned defects without loss of the great resolving power. In fact, they claim a slight gain. I have not yet completed my own first tests of this film, so can speak only from what I have read. The gist of this is that the contrast has been reduced, thus easing both the problem of lighting and that of correct exposure; the speed has been increased slightly, though not to the

point where it will in itself cause any great revolution; and color fidelity is said to have been greatly improved, with special attention paid to reducing the tendency of reds to go orange, of blues to be too blue, and yellows to wash out. If this is all as reported the new Kodachrome II will be somewhat of a boon. Both types of Kodachrome are and will continue to be available to still photographers only in 35 mm. size. Kodachrome is out in daylight, flash, and tungsten emulsions. Kodachrome II is presently out in daylight, though a tungsten emulsion will follow shortly.

The next films to be considered will be Eastman's series of Ektachromes. Mainly there are three types, Ektachrome E-2, Ektachrome E-3, and High Speed Ektachrome. The first is their most readily available type and is a good all around film with excellent color fidelity throughout the spectrum except in certain delicate shadings between yellow and orange where ambiguity exists. Reds tend to be less orange than in Kodachrome, and violets and lavenders are produced particularly well. The E-3 type is similar to the E-2, but the fidelity in the yellows and oranges is better. Where available, this is a very fine film for scientific uses.

The High Speed Ektachrome is about like E-2 in color rendition, and has the highest normal film speed of any color film made. Where the need is for such high speed coupled with good colors, this is the film to use. Grain, however, is somewhat of a problem. By comparison to Kodachrome all other color films are grainy and not so good in resolution. In practice E-2 and E-3 Ektachrome, and the Anscochrome discussed later, are all quite satisfactory and can usually be used without disadvantage. High Speed Ektachrome is, on the other hand, grainy enough so that it may sometimes affect results. With all the Ektachromes contrast is sufficient to give good modeling, but not so great as to obscure normal rendition of shadow detail or to cause problems of exposure exactitude. Ektachrome E-2 is available in daylight and flash emulsions, E-3 and High Speed Ektachrome both in daylight and tungsten emulsions. E-3 is not, however, sold in 35 mm. size.

Lastly, we come to the Ansco products. The regular Anscochrome is comparable in nearly all respects to the two normal speed Ektachromes. Color rendition is without noticeable defects. It seems particularly good in reds, blues, and greens. Yellows seem not to suffer. Contrast and speed are moderate, and exposure latitude is good. Resolution and grain are satisfactory.

This manufacturer also makes Super-Anscochrome. For most scientific uses I personally do not care for this film. It has speed not far short of High Speed Ektachrome and is probably the most "pushable" color film made. That is, it can be forcibly developed to produce quite unusually high speed if one is willing to make sacrifices in grain and color fidelity. For most scientific uses, however, the color fidelity — even at normally rated speeds — is simply too poor. Reds go toward the brick-red. Violets and purples just come out as blues, and olive green comes out as a dirty grey. In normal use grain and resolution are similar to High Speed Ektachrome. In roll film sizes Anscochrome is available only in daylight emulsion. Super-Anscochrome can be had in daylight and tungsten emulsions.

In summary, one should choose a color film according to one's needs. For color copy or other use where brilliant color, high contrast, and high resolution are prime requisites, Kodachrome is the choice. For high speed with good color, use High Speed Ektachrome. For highest speeds — with forced development — without regard to color fidelity and grain, use Super-Anscochrome. For most other uses Kodachrome II, Ektachrome E-2 and E-3, and regular Anscochrome will all produce good results.

TECHNIQUES

Photography of live marine mollusks will usually be attempted in one of two locations. One may wish to do the job at tide-pool locations where the animals can be seen in their natural habitats, or it may be that the researcher's purposes will be better served by a studio situation where more attention can be paid to showing the form and color of the subject without concern for natural backgrounds. Since relatively little can be done in the former case, I here emphasize the studio methods.

The first requirement is an aquarium with one side made of clean plate glass of sufficient quality to minimize optical deviations when photographing through it. Cleanliness is essential, as any scum or other deposits on either side of the glass will have a very adverse effect on the sharpness of one's pictures. The water should also be as fresh and clean as possible for the same reason. In some cases, where one may wish to photograph directly downwards from above, a rather wide shallow container may serve. For most people, however, it will be more convenient to use an aquarium of normal proportions, placing one's camera in a horizontal position on a tripod.

Next comes the question of which type of

camera is most suitable for this purpose. In my opinion, since the 35 mm. projection slide is the usual final objective, the most convenient instrument will be a 35 mm. single lens reflex. This type of camera allows direct viewing of the subject right up to the instant of exposure, a good feature where the subject is likely to be in motion across the field of view.

While good use can be made of the normal focal length lens of such cameras (usually about 50 mm.), it will often be found desirable to use a lens of longer than normal focal length. This is because such lenses will, at the same image magnification, allow a greater working distance between subject and lens. Of course, this may necessitate a longer bellows extension in order to get a desired image size. This is a matter for the photographer to decide according to his existing equipment and his means for getting more.

A setup which I have found useful is to arrange a sheet of glass within the tank in a vertical position and only an inch or so back from the side which will be the viewing port. The mollusks to be photographed can often be induced to adhere to this surface and will then be in position as though one were photographing directly down upon them. Some distance behind this glass is placed some piece of material of a color suitable for a pleasing background. For projection slides I have found that black seems to enhance the natural beauty of most colored specimens, especially as marine mollusks often have light or delicately shaded colors. If a light background is used, it may seem to sap the color of the specimen. This background is placed well back of the subject plane so that no sharp shadow will be thrown upon it and thereby cause edge lines to become ambiguous.

If it is desired to show the specimen in profile rather than from above, probably the best arrangement is to place a piece of material found in the habitat — perhaps stone or abalone shell — on the floor of the aquarium, and pose the specimen upon it. A background as described above can then be placed beyond to remove all unnecessary confusion from the background.

Lighting is probably best accomplished with either normal flash bulb attachments or with electronic flash, according to one's means. Flood lights usually do not allow sufficient speed in exposure. The simplest arrangement practical is to place one flash unit slightly above and to one side of the camera so that its light will strike the subject from an appropriate direction. Then, as close to the subject as can be arranged without entering the picture area, one places a white reflecting material directly opposite, that is, slightly below, on the side opposite the flash unit, though still on the camera side of the subject. This will cause enough light to bounce back to lighten the shadow areas.

A more comprehensive system of lighting would use three lights, all with a diffusing screen (white drafting tissue paper will do) placed in front to cut the harshness. One light is placed directly above the aquarium, pointing straight down on the subject. The other two would be placed one on each side of the camera. They would each be slightly above the camera level and would toe in so that their beams would converge on the subject. The object is to light the necessary area evenly, brightly, and softly with no obviously overlapping shadows. Some trial exposures should be made wherever possible in order to make sure that the lighting effects are harmonious.

Exposure will prove to be a matter for some conjecture. This is due in part to the light absorption of the glass of the tank and the water which fills it. Normally, flash exposures are determined by guide number, according to the instructions to be found upon the package of bulbs. The guide number is a function of three things: the type of bulb, the speed of the film, and the speed of the shutter. Knowing this guide number, one divides it by the distance in feet between the subject and the bulb. The resulting number is the diaphragm or f/stop to be used. In this use the guide number method of calculation is used as a starting point. Then several exposures should be made at slightly differing f stops. One should be on the calculated value, others should go above and below this in half-stop increments. Using any given standard setup only, one series of tests like this should prove sufficient to guide one's actions in the future. It is always well, however, especially when the subject is rare or not easily replaceable, to cover things by making three different exposures for each desired shot: one on, one above, and one below. This assures the best results possible. The cost of the wasted film is much less than that of obtaining new specimens, when a single exposure has failed.

There now come several points for cautioning. One is that care should be taken to place the camera at right angles to the side of the aquarium to be shot through. Any slight angling-in will be likely to cause optical deviation through an offsetting of the image as it passes angularly through the glass. This results in an effect of slight stretching of the image in one direction and can ruin resolution of fine detail. The next thing to watch for is that improper placing of the lights will send re-

flections from the glass side of the tank into the camera lens, thus partially or completely obscuring the subject. And watch out also to see that no light sends its beams directly into the lens. At the very least, one will get a general weakening of the image and a lowering of contrast. So, shade the lens well.

No attempt has been made here to provide detailed drawings of any particular setup, or to give other overly detailed instructions. This is because every subject and every need will dictate changes and thereby nullify the value of the advice. In this area it is perhaps best to be general and allow the individual maximum room for decision according to his needs and equipment. About the only thing I can think of now is to observe how quickly the little devils can move across one's ground glass and out of the picture area. Be quick, but not abrupt.

Notes & News

Range Extension for *Trivia elsiae* Howard & Sphon

by

Faye B. Howard

Conchological Club of Southern California
Los Angeles 7, California

Shortly after the description of Trivia (Pusula) elsiae Howard and Sphon, 1960, had gone to press — before it had actually appeared in the Veliger, vol. 3, no. 2, October 1, 1960 — a range extension was found.

The type locality was given as Punta Final, Baja California, Lat. 29°45'N.; Long. 114°25'W. One hypotype was cited from Bahia de Los Angeles, Baja California, about 75 miles south of the type locality. The shells described were all taken intertidally or from drift on shore.

In early September, 1960, the author had the opportunity to work over some of the small material from the dredge hauls of the Ariel Expedition taken near Isla del Carmen, Baja California. This material was taken August 29, 1960, at a depth of 25 fathoms. One apparently alive-taken, but slightly damaged, Trivia elsiae was found. It would be futile to attempt to mention associated species of shells because of the great numbers — about 85 species of pelecypods, well over 100 gastropods, at least three chitons, and fragments of one or more scaphopods. All these were taken from not more than a quart of unwashed dredgings.

This occurrence of Trivia elsiae near Isla del Carmen extends the geographic range southward about 250 miles and bathymetrically from intertidal to a depth of 25 fathoms.

Literature Cited

Howard, Faye B., & Gale G. Sphon, Jr.
1960. A new Panamic species of Trivia. The Veliger, 3 (2): 41-43, pl. 7.

Range Extension for *Tenaturris nereis* (Pilsbry & Lowe, 1932)

by

Helen DuShane

Conchological Club of Southern California
Los Angeles 7, California

This report concerns a living specimen of Tenaturris nereis (Pilsbry & Lowe, 1932) taken at San Felipe, Baja California, Mexico, June 10, 1960. The specific location for this shell is one mile north of the San Felipe lighthouse, at low tide, under a rock, near the edge of a sand beach.

The type locality for this shell according to Sea Shells of Tropical West America (Keen, 1958) is San Juan del Sur, Nicaragua. Although the Pilsbry and Lowe specimen was 7.6 mm. in length and 3 mm. in width, this single specimen exceeds these dimensions; it is 12 mm. in length and 6 mm. in width.

Literature Cited

Keen, A. Myra
1958. Sea shells of tropical West America. xi, 624 p. illus. Stanford Univ. Press, Stanford, Calif.

Name Change in *Mitra*

by

Jean M. Cate

Conchological Club of Southern California
Los Angeles 7, California

The necessity for changes in several specific names has been apparent since Opinion 456 was published in 1957 by the International Commission for Zoological Nomenclature; this decision invalidated the four volumes of Thomas Martyn's Universal Conchologist because the